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An ACCOUNT of the  
**GLACIERES**  
OR  
**ICE ALPS**  
IN  
**S A V O Y,**  
In TWO LETTERS,

One from an

*English Gentleman to his Friend at Geneva ;*

The other from

**PETER MARTEL**, Engineer,  
to the said *English Gentleman*.

Illustrated with a MAP, and two Views of the  
PLACE, &c.

As laid before the ROYAL SOCIETY.

L O N D O N,

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AN ACCOUNT OF THE  
GLACIERS

OF THE  
ALPS

IN TWO LETTERS

WRITTEN BY  
M. DE SAUSSURE

TO THE  
GENTLEMEN OF THE SOCIETY



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*A LETTER from an English Gentleman to Mr. Arlaud, a celebrated Painter at Geneva, giving an Account of a Journey to the Glacieres, or Ice Alps in Savoy, written in the Year 1741. Translated from the French.*

S I R,

**A**CCORDING to your Desire I send you an Account of our Journey to the *Glacieres*. I shall give it you in the plainest Manner, without endeavouring to embellish it by any florid Descriptions, although the Beauty and Variety of the Situations and Prospects that we observed in this unfrequented Part of the World, would well deserve to be described by one, who, like you, join to so great a Skill in Painting so lively and poetical an Imagination; but these not being my Talents, I will, as I said before, confine myself to the giving you a faithful Relation of the Incidents of our Journey, and acquainting you with the Observations we made. I shall add a few Hints, which may be useful to such as shall hereafter have the same Curiosity that we had, and who may perhaps have Advantages and Conveniences which we had not to make more accurate Observations. It is really Pity that so great a Curiosity, and which lies so near you, should be so little known; for though *Scheuchzer*, in his *Iter Alpinum*, describes the *Glacieres* that are in the Canton of *Berne*, yet they seem to me by his Description to be very different from those in *Savoy*.

I had long had a great Desire to make this Excursion, but the Difficulty of getting Company had made me defer it: Luckily in the Month of *June* last \* *Dr. Pococke* arrived at *Geneva* from his Voyages into the *Levant* and *Egypt*, which Countries he had visited with great Exactness. I mentioned to him this Curiosity, and my Desire to see it, and he who was far from fearing Hardships, expressing a like Inclination, we immediately agreed to go there; when some others of our Friends found a Party was made, they likewise came into it, and I was commissioned to provide what was necessary for our setting out.

\* The same who has lately published so accurate and ingenious an Account of his Travels.

As we were assured on all hands, that we should scarcely find any of the Necessaries of Life in those Parts, we took with us Sumpter Horses, loaded with Provisions, and a Tent, which was of some use to us, though the terrible Description People had given us of the Country was much exaggerated. I had provided several Mathematical Instruments to take Heights, and make Observations with, hoping that Mr. *Williamson*, an able Mathematician, Governor to Lord *Hadinton*, would have been of the Party; but he declining it, on account of the Fatigue which he fear'd he should not be able to support, I chose not to take the Trouble of carrying them, there being no Person in the Company so capable as he of making a proper use of them.

We set out from *Geneva* the 19<sup>th</sup> of *June*, N. S. we were \* Eight in Company, besides five Servants, all of us well arm'd, and our Baggage-Horses attending us, so that we had very much the Air of a Caravan. The first Day we went no farther than *Bonneville*, a Town about four Leagues distant from *Geneva*, according to the way of reckoning there; these four Leagues took us more than six Hours riding. This Place is situated at the Foot of the *Maule*, and close by the River *Arve*; 'tis surrounded with beautiful Meadows and high Mountains, covered with Trees, which form all together a very delightful Situation. There is a very good Stone-Bridge near the Town, but it had suffered in the late Innundation of the *Arve*, which had carried away part of it. Our Inn was a tolerable one for *Savoy* as to every thing but Beds.

The next Day being the 20<sup>th</sup>, we set out very early in the Morning, and passed the *Arve*; our Road lay between that River and the Mountains, all along which we were entertained with an agreeable Variety of fine Landskips. They reckon two Leagues from *Bonneville* to *Cluse*, but we were three Hours and an half in going it.

*Cluse* is situated in a narrow Pass between the Mountains, which almost meet in this Place [leaving only room for the *Arve*, which is thus hemm'd in for above a League together.] Before you come to *Cluse* there is a kind of Hermitage, upon a Rock on the Right Hand, where we climb'd up in order to enjoy the Prospect, which is delicious; after that we passed the *Arve* over a fine Stone Bridge, of one very large Arch, and continued our Journey for about an Hour and an half through a narrow Road, along the *Arve*, between Rocks

\* Viz. Lord *Hadinton*, the Honourable | *Aldworth*, *Pococke*, *Price*, *Windham*, and Mr. *Baillie* his Brother, and Mess. *Chetwynd*, | *Stillingfleet*.



of a prodigious Height, which look'd as if they had been split on purpose to give the River a Passage. Not to mention the Beauty of the Views all along, we were extremely entertained by continual Echoes, and the prodigious rattling, caused by cracking a Whip, or firing a Pistol, which we repeated several Times. We saw Cascades on every Side, which fell from the Top of high Rocks into the *Arve*. There is one among the rest of singular Beauty, it is called the *Nan d'Arpena*, 'tis a great Torrent, which falls from a very high Rock; all the Company agreed it must be higher than \* *Saleve*. As for my Part, I will not pretend to decide about it, I however may venture to say, that the Cascade of *Terni* does not fall from near so great a Height; but then the Quantity of Water, when we saw it, was much less than at this last mentioned Place; tho' the People of the Country assured us, that at certain times the Water is much more abundant than it was then.

After about three Hours riding from *Cluse*, we came to Saint *Martin's* Bridge, right against *Salanches*, which is on the other Side of the *Arve*. We did not care to go out of our Way into the Town; but chose rather to encamp in a fine Meadow near the Bridge, in order to refresh ourselves. From thence we set out again on our Journey, and after four Hours riding through very bad Ways, being obliged to cross some dangerous Torrents, we arrived at a little Village called *Servoz*. Our Horses suffered here very much, being tied to Pickets all Night in the open Air for want of Stabling; besides, there was neither Oats, nor any other Forrage, but Grass fresh cut; as for ourselves, as we had brought all Necessaries along with us, we were well enough off, except as to Beds, and that want was supplied by clean Straw in a Barn.

From thence we set forward at break of Day, and passed the *Arve* once more over a very bad wooden Bridge, and after having clim'd over a steep Mountain, where we had no small Difficulty with our Horses, their Shoes coming off continually, and they often running the risque of tumbling into the *Arve*, which run at the Bottom of the Rock, we came into a pleasant Valley, where we pass'd the *Arve* a fourth time over a Stone Bridge, and then first had a View of the *Glacieres*. We continued our Journey on to *Chamouny*, which is a Village upon the North-side of the *Arve*, in a Valley, where there is a Priory belonging to the Chapter of *Salanches*; here we encamp'd, and while our Dinner

\* *Saleve* is a Mountain, about three Miles from *Geneva*, whose perpendicular Height is about 1150 French Feet.

#### 4 *An Account of the Glacieres in Savoy.*

was preparing, we inquired of the People of the Place about the *Glacieres*. They shewed us at first the Ends of them which reach into the Valley, and were to be seen from the Village; these appear'd only like white Rocks, or rather like immense Icicles, made by Water running down the Mountain. This did not satisfy our Curiosity, and we thought we were come too far to be contented with so small a Matter; we therefore strictly inquired of the Peasants whether we could not by going up the Mountain discover something more worth our Notice. They told us we might, but the greatest Part of them represented the Thing as very difficult and laborious; they told us no-body ever went there but those whose Business it was to search for Crystal, or to shoot \* *Bouquetins* and *Chamois*, and that all the Travellers, who had been to the *Glacieres* hitherto, had been satisfied with what we had already seen.

\* The *Bouquetins* are Animals much larger, and less Shaggy than a Goat; for their Figure, see *Plate 4. Let. a.* They live in the highest Mountains, and come down very rarely, for which reason the Trouble and Danger of Hunting them is very great; they are very courageous, making use of their great Horns for Defence, when attack'd; they are very cunning, and by the Wind smell the Hunter a vast way off; when chased, they leap an incredible Distance, and being pursued closely will throw themselves down high Precipices, and by falling upon their Horns break their Fall so as not to hurt themselves. The Edges of their Hoofs, or Claws, are so sharp and hard, that the Impression of them may be seen on Stones. Their Blood is esteemed as a sovereign Remedy in Pleuritic Disorders, which is reckoned to be owing to the Herbs they feed on in these Mountains, particularly an Herb called, in the Language of the Country, *Genepi*. *Chamois* is a Kind of Goat, only stronger; for their Figure, see *Plate 4. Let. b.* They keep on the high Mountains of the *Alps*; they are very fond of licking certain Rocks, of a kind of soft crumbling Stone, which is Salt, and in those Places the

Hunters go to look for them, and surprise them, which is however very difficult, for they always have some of the Herd standing on high Rocks as Centries, and when they perceive any Danger they give the Alarm by a Noise they make, upon which the rest betake themselves to the Precipices, where it is impossible to follow them. Sometimes this kind of Sport becomes dangerous, not only by reason of the craggy Rocks one must climb up to, but because it often happens that the Hunter pursues the *Chamois* into some narrow Pass, where there is but just Foot hold for one Person, having on one side a steep Rock above him, and beneath a frightful Precipice; the *Chamois* then having no way to escape is obliged to turn upon the Hunter, and endeavours either to jump over him, or else squeeze between him and the Rock, in which case he pushes the Man down the Precipice; so that all he has to do is either to lay down, or else, by struggling, make good his Place, and thrust the Beast down the Rock. It is with their Horns that the little Reed-canes Ladies carry are generally tipped, and of their Skins is made the true Shammy Leather.

The



The Prior of the Place was a good old Man, who shewed us many Civilities, and endeavoured also to dissuade us; there were others who represented the Thing as mighty easy; but we perceived plainly, that they expected, that after we had bargain'd with them to be our Guides, we should soon tire, and that they should earn their Money with little Trouble. However our Curiosity got the better of these Discouragements, and relying on our Strength and Resolution, we determined to attempt climbing the Mountain. We took with us several Peasants, some to be our Guides, and others to carry Wine and Provisions. These People were so much persuaded that we should never be able to go through with our Task, that they took with them Candles and Instruments to strike Fire, in case we should be overcome with Fatigue, and be obliged to spend the Night on the Mountain. In order to prevent those among us who were the most in wind, from fatiguing the rest, by pushing on too fast, we made the following Rules: That no one should go out of his Rank; That he who led the way should go a slow and even Pace; That who ever found himself fatigued, or out of Breath, might call for a Halt; And lastly, that when ever we found a Spring we should drink some of our Wine, mixed with Water, and fill up the Bottles, we had emptied, with Water, to serve us at other Halts where we should find none. These Precautions were so useful to us, that, perhaps, had we not observed them, the Peasants would not have been deceived in their Conjectures.

We set out about Noon, the 22<sup>d</sup> of June, and crossed the *Arve* over a wooden Bridge. Most Maps place the *Glacieres* on the same Side with *Chamoigny*, but this is a Mistake. We were quickly at the Foot of the Mountain, and began to ascend by a very steep Path through a Wood of Firs and Larche Trees. We made many Halts to refresh ourselves, and take breath, but we kept on at a good Rate. After we had passed the Wood, we came to a kind of Meadow, full of large Stones, and Pieces of Rocks, that were broke off, and fallen down from the Mountain; the Ascent was so steep that we were obliged sometimes to cling to them with our Hands, and make use of Sticks, with sharp Irons at the End, to support ourselves. Our Road lay slant Ways, and we had several Places to cross where the \* *Avalanches* of Snow were fallen,

\* *Avalanche*. To explain the meaning of this Word, I believe it will not be unentertaining to the Reader to cite some Passages from the *Delices de la Suisse*,

which contain some curious Particulars relating to those mountainous Parts of the World.

## 6 *An ACCOUNT of the Glacieres in Savoy.*

and had made terrible Havock ; there was nothing to be seen but

“ Besides these Ice Mountains, the  
 “ Snows are extremely dangerous to  
 “ Travellers. There often fall from these  
 “ high Mountains immense Balls of  
 “ Snow, which are called in *German La-*  
 “ *winen*, in *Italian Lavine*, in *French*  
 “ *Avalanches*, which by the Impetuosity  
 “ of their Fall make a Noise like a Clap  
 “ of Thunder; so that those that are at a  
 “ Distance imagine it to be really so, as  
 “ I remember it happened to myself  
 “ some Years since, having heard one  
 “ that fell in the *Vallais*, though I was  
 “ above twenty Leagues distant from it.  
 “ Sometimes it is caused by the new fallen  
 “ Snow, which being driven by the  
 “ Violence of the Wind, forms vast  
 “ Snowballs, which gather by rolling, and  
 “ overwhelm every thing they meet,  
 “ both Men and Beasts. As it is very dif-  
 “ ficult to avoid them, because they are  
 “ extremely sudden, so, being very light,  
 “ a Man may remain under them longer  
 “ without being suffocated; but there  
 “ are others which are occasioned by the  
 “ Thaws in the Spring, which are much  
 “ more dangerous, great Masses of old  
 “ Snow, melting underneath, fall off at  
 “ once, making a terrible Noise, but  
 “ still more Ravage, not only destroy-  
 “ ing Men and Cattle, but even Trees  
 “ and Houses. *Claudian*, who lived in  
 “ the fourth and fifth Centuries, informs  
 “ us, that such Accidents were known in  
 “ his Time, *Vide 4<sup>to</sup> Consul. Honorii* :

“ multos hausere profundæ

“ Vasta mole nives; cumque ipsis sæpe juvencis  
 “ Naufraga candenti merguntur plaustra barathro,  
 “ Interdum subitam, Glacie labente, ruinam  
 “ Mors dedit.

“ A Trifle will produce these terrible  
 “ Accidents in the *Alps*, the Flight of a  
 “ Bird, the Leaping of a *Chamois*, the  
 “ firing a Pistol, a Shout, speaking loud,  
 “ the Bells of the Mules and Pack-  
 “ Horses, or even a gentle Rain are suf-  
 “ ficient to loosen this Snow, and bring  
 “ it down to the Destruction of Passen-  
 “ gers; so little hold has it on these steep  
 “ Places. For this Reason they always  
 “ take great Care to caution Travellers  
 “ in Places where there is danger of this  
 “ Sort, to travel early, and in great Si-  
 “ lence, and to get through as fast as  
 “ possible, as one would out of a House  
 “ on Fire: And the *Voiturins* fill with  
 “ Hay or Straw the Bells of their Beasts,  
 “ in some Places, as in the *Val d'Aversa*;  
 “ in the *Grisons* they put the Bells on-  
 “ ly a Foot above the Ground, that their  
 “ Sound should not extend so far as to  
 “ cause Danger, and in several Places  
 “ they do not use them at all for that  
 “ Reason. In the Lower *Engadine*, be-  
 “ tween the Villages of *Lavin* and *Guar-*  
 “ *dia*, there are all along the Road se-  
 “ veral Caves made in the Rocks for  
 “ Travellers to retire into when they see  
 “ any of these Mountains of Snow fall-  
 “ ing; but if they are so unfortunate as  
 “ not to be able to reach such a Place,  
 “ the only way is to get as close to some  
 “ Rock as possible, and cling to it, so  
 “ as not to be carried away, and to en-  
 “ deavour to keep their Head free,  
 “ to be able to breath till Assistance  
 “ comes; for in all these Places there  
 “ are People paid by the Magistrates to  
 “ look after the Ways, and keep them  
 “ always open; and as soon as there is  
 “ fallen any Quantity of Snow, they go  
 “ and mend the Ways, smooth the Snows  
 “ with large Pieces of Wood, drawn by  
 “ Oxen, and shovel it away, and at the  
 “ same time examine all dangerous Pla-  
 “ ces to see if there is no poor Traveller  
 “ buried under the Snow. The Histo-  
 “ ries of *Switzerland* are full of the ter-  
 “ rible Ravages made in several Places,  
 “ at different times, by these *Avalanches*

Trees



Trees torn up by the Roots, and large Stones, which seemed to lie without any Support; every step we set, the Ground gave way, the Snow which was mixed with it made us slip, and had it not been for our Staffs, and our Hands, we must many times have gone down the Precipice. We had an uninterrupted View quite to the Bottom of the Mountain, and the Steepness of the Descent,

“ in 1499. When the Emperor *Maxi-*  
 “ *milian* made War upon the *Grisons*, a  
 “ Body of 2000 Men of his Troops  
 “ having been ordered to pass a high  
 “ Mountain to go into the *Engadine*, an  
 “ *Avalanche* falling suddenly upon them,  
 “ buried 400 Soldiers, which at first  
 “ caused great Confusion and Terror in  
 “ the rest, which was soon turned into  
 “ Laughter, when they saw all the 400  
 “ Men safe and sound out of their snowy  
 “ Tomb, not one being lost: But the  
 “ Year following a Body of *Switzers*,  
 “ going into *Italy* for the Service of the  
 “ *French*, was surprized on the Mount of  
 “ *St. Bernard*, by a horrible *Avalanche*  
 “ which destroyed a hundred of them.  
 “ And in our Memory, in the Year 1695,  
 “ on the 21<sup>st</sup> of *February*, at Ten o’Clock  
 “ at Night, a violent Wind brought  
 “ down a most terrible *Avalanche* of  
 “ above 100 Yards in width upon a  
 “ Village in the *Vall Madia*, which de-  
 “ stroyed eleven Houses, with as many  
 “ Barns and Stables, so entirely, that there  
 “ scarce remained one Stone upon an-  
 “ other, and very much damaged nineteen  
 “ other Houses that remained. The  
 “ Violence of the Wind blew open the  
 “ Windows of some Houses, and filled  
 “ them with Snow; thirty-four Persons  
 “ perished in this Storm, some were  
 “ taken alive, almost miraculously from  
 “ under the Snow, amongst others a  
 “ Mother and two Children. It happens  
 “ very often that Travellers who are  
 “ caught in the Snows are happily pre-  
 “ served and saved from Death. When  
 “ any one is found seemingly dead, with-  
 “ out Sense or Motion, the first Reme-  
 “ dy is to plunge him in cold Water.  
 “ To some it will appear both barbarous  
 “ and ridiculous to dip a Man, who is  
 “ frozen, and almost dead with Cold,

“ into cold Water; but let them know  
 “ that it would be certain Death to any  
 “ one to give him heat suddenly when he  
 “ is frozen. They begin therefore with  
 “ dipping him into cold Water, upon  
 “ which his whole Body is covered with  
 “ a Crust of Ice; afterwards he is put  
 “ into luke-warm Water, then proceed-  
 “ ing by Degrees, they get him into a  
 “ Bed well warmed, and finish his Cure  
 “ by Cordials and Fomentations. And  
 “ this Rule holds good also with regard to  
 “ Fruits, when the Frost has caught them;  
 “ one must never carry them at once into  
 “ a warm Place, but the way is to dip  
 “ them into cold Water, and then into  
 “ warm Water, by which means they be-  
 “ come pretty good again. I will not  
 “ leave this Subject without observing a  
 “ thing, which is truly a physical Para-  
 “ dox, which is, that the Water that runs  
 “ from the *Gletschers*, or Ice Mountains,  
 “ that I have mentioned before, is the  
 “ best and wholesomest that one can drink.  
 “ A Traveller that passes those Mountains  
 “ can drink no other Water if he is heat-  
 “ ed, without Danger of catching a fatal  
 “ Distemper; but he may without Dan-  
 “ ger drink this Ice Water, whether fast-  
 “ ing, or after eating, and it has a kind  
 “ of balsamick Virtue to restore and for-  
 “ tify after any Fatigue; this is a known  
 “ Fact, and proved by constant Expe-  
 “ rience. The Inhabitants of the *Alps*  
 “ know no other Remedy in *Diarrhoea’s*,  
 “ *Dysenteries*, and Fevers, than this Wa-  
 “ ter of the *Gletschers*, and a celebrated  
 “ Physician has recommended it for the  
 “ Tooth-Ach. A Man who passes thro’  
 “ these Parts ought carefully to avoid two  
 “ Things, *viz.* drinking common Water,  
 “ and sleeping near a Fountain, or in the  
 “ Snow, since they commonly prove  
 “ fatal.”

join’d

join'd to the Height where we were, made a View terrible enough to make most People's Heads turn. In short, after climbing with great Labour for four Hours and three Quarters, we got to the Top of the Mountain; from whence we had the Pleasure of beholding Objects of an extraordinary Nature. We were on the Top of a Mountain, which, as well as we could judge, was at least twice as high as Mount *Saleve*, from thence we had a full View of the *Glacieres*. I own to you that I am extremely at a Loss how to give a right Idea of it; as I know no one thing which I have ever seen that has the least Resemblance to it.

The Description which Travellers give of the Seas of *Greenland* seems to come the nearest to it. You must imagine your Lake put in Agitation by a strong Wind, and frozen all at once, perhaps even that would not produce the same Appearance.

The *Glacieres* consist of three large Valleys, that form a kind of Y, the Tail reaches into the *Val d'Aoste*, and the two Horns into the Valley of *Chamoigny*, the Place where we ascended was between them, from whence we saw plainly the Valley, which forms one of these Horns.

I had unluckily left at *Chamoigny* a pocket Compass, which I had carried with me, so that I could not well tell the Bearings as to its Situation; but I believe it to be pretty nearly from North to South. These Valleys, although at the Top of a high Mountain, are surrounded with other Mountains; the Tops of which being naked and craggy Rocks, shoot up immensely high; something resembling old *Gothic* Buildings or Ruines, nothing grows upon them, they are all the Year round covered with Snow; and our Guides assured us, that neither the *Chamois*, nor any Birds, ever went so high as the Top of them.

Those who search after Crystal, go in the Month of *August* to the Foot of these Rocks, and strike against them with Pick-axes; if they hear them resound as if they were hollow, they work there, and opening the Rock, they find Caverns full of Crystalisations. We should have been very glad to have gone there, but the Season was not enough advanced, the Snow not being yet sufficiently melted. As far as our Eye-sight could reach, we saw nothing but this Valley; the Height of the Rocks, which surrounded it, made it impossible for the Eye to judge exactly how wide it was; but I imagine it must be near three Quarters of a League. Our Curiosity did not stop here, we were resolved to go down upon the Ice; we had about four hundred Yards to go down, the Descent was excessively steep, and all of a dry crumbling Earth, mixt with Gravel,



vel, and little loose Stones, which afforded us no firm footing; so that we went down partly falling, and partly sliding on our Hands and Knees. At length we got upon the Ice, where our Difficulty ceased, for that was extremely rough, and afforded us good footing; we found in it an infinite Number of \* Cracks, some we could step over, others were several Feet wide. These Cracks were so

\* "In some Places there are found Mountains of Ice, which not only never melt, but always increase by the falling of fresh Snow, so that by little and little they extend themselves, and cover the Country all about them. The *Germans* call them *Gletscher*, we call them commonly *Glacieres*. These Ice Mountains are mostly of an immense Height, and sometimes they split from Top to Bottom, which they do with so horrible a Noise, that one would think the whole Mountain was breaking in Pieces; these Clefts differ as to the Width and Depth; there are some two, three, or four Feet wide, and three or four hundred Yards deep, and if a Man falls in he is almost inevitably lost, being either killed by the Cold, or drowned in the melted Snow: However, in many Places, one is obliged to pass over these Mountains, there being no other Way, and when there is any Snow new fallen it is very dangerous, for the Ice covers these terrible Clefts, so that the Travellers are taken as Birds in a Snare, and fall in and perish. To avoid these Misfortunes Travellers take Guides, who with long Poles sound the way to see there is no Cleft, and when they find one they must jump over, or else they pass over a Board, which they carry for that Purpose. The Difficulty augments when there is Snow new fallen, for then one sees no track of the way at all, and one must observe certain Poles set up to shew the way, which the *Grisons* call *Stazas*; but in many Places the Inhabitants set up none, that the Travellers may be obliged to pay them well for being their Guides. On these Occasions it is necessary to have Iron Cramps to ones Shoes, not to slip, and withal take great Care where one sets one's Feet; and on this Occasion I hope the Reader will not blame me

for inserting a wonderful Adventure which happened some Years ago to a Hunter of *Glaris*, named *Gasper Stöeri*. This Man being in pursuit of *Chamois*, with two other Hunters on Mount *Limmeren*, and thinking he was walking on the Snow very safely, fell into a deep Cleft of the Ice: His Companions, who lost sight of him, were in great Uneasiness, and expected no otherwise than that he must be killed, either by the Fall, or by the Cold of the Ice. Nevertheless that they might not reproach themselves with letting him perish, without endeavouring to help him, they ran to the nearest Cottage, which was full a League off, to look for a Rope, or something else to assist him; but finding nothing there but an old Blanket, they cut it into long Slips, and went to the Hole where their Companion was. While they were going and coming, poor *Stöeri* was almost dead with Cold, being up to his Middle in ic'd Water. The Depth of which was so great under him, that he could not see to the Bottom, and by extending his Arms and Legs, he held himself fast against the Sides of the Cleft of Ice, so that he was shut up there, as it were, in a close, cold, and deep Dungeon. You may imagine in what a Situation he was, he expected nothing but Death, and was recommending his Soul to God, when his Companions arrived, who let down the Slips they had cut, to pull him out; he had Strength enough to tie them about his Body, and by this Means was drawn up to the Top of the Pit; but as he was just upon the Point of being delivered, unhappily the Slip which held him up broke, and he fell again into the iced Water, and was in greater Danger than before. He carried down with him a Piece of the Slip which broke, and the Remainder was not long enough deep,

deep, that we could not even see to the Bottom ; those who go in search of Crystal are often lost in them, but their Bodies are generally found again after some Days, perfectly well preserved. All our Guides assured us, that these Cracks change continually, and that the whole *Glaciere* has a kind of Motion. In going up the Mountain we often heard something like a Clap of Thunder, which, as we were informed by our Guides, was caused by fresh Cracks then making ; but as there were none made while we were upon the Ice, we could not determine whether it was that, or *Avalanches* of Snows, or perhaps Rocks falling ; though since Travellers observe, that in *Greenland* the Ice cracks with a Noise that resembles Thunder, it might very well be what our Guides told us. As in all Countries of Ignorance People are extremely superstitious, they told us many strange Stories of Witches, &c. who came to play their Pranks upon the *Glacieres*, and dance to the Sound of Instruments. We should have been surpris'd if we had not been entertained in these Parts, with some such idle Legends. The *Bouquetins* go in Herds often to the Number of fifteen or sixteen upon the Ice, we saw none of them ; there were some *Chamois* which we shot at, but at too great a Distance to do any Execution.

There is Water continually issuing out of the *Glacieres*, which the People look on as so very wholesome, that they say it may be drank of in any Quantities without Danger, even when one is hot with Exercise.

The Sun shone very hot, and the Reverberation of the Ice, and circumjacent Rocks, caused a great deal of thaw'd Water to lie in all the Cavities of the Ice ; but I fancy it freezes there constantly as soon as Night comes on.

Our Guides assured us, that, in the time of their Fathers, the *Glaciere* was but small, and that there was even a Passage thro' these Valleys, by which they could go into the *Val d'Aoste* in six Hours : But that the *Glaciere* was so much increased, that the Passage was then quite stopped up, and that it went on increasing every Year.

to reach him, and, as an additional Misfortune, in this second Fall he broke his Arm. However his Companions did not lose Courage, they divided the Slip again, and joining the Pieces end to end, lower'd them down to him ; he with great Difficulty, with his broken Arm, tied it round his Body, while with the other he held to the Sides of his Dungeon, and with this

weak Instrument, by a Miracle of Providence, was drawn out of this terrible Pit, and though he had at first fainted away, God gave him Strength to come to himself, and to bear the Fatigue of being carried to a House where he entirely recovered." *Vid. Delices de la Suisse, Tom. 1. pag. 22. & seq.*

We



*An Account of the Glacieres in Savoy.* 11

We found on the Edge of the *Glaciere* several Pieces of Ice, which we took at first for Rocks, being as big as a House; these were pieces quite separate from the *Glaciere*. It is difficult to conceive how they came to be formed there.

Having remained about half an Hour upon the *Glaciere*, and having drank there in Ceremony Admiral *Vernon's* Health, and Success to the *British* Arms, we climb'd to the Summit, from whence we came, with incredible Difficulty, the Earth giving way at every step we set. From thence, after having rested ourselves a few Minutes, we began to descend, and arrived at *Chamouny* just about Sun-set, to the great Astonishment of all the People of the Place, and even of our Guides, who owned to us they thought we should not have gone through with our Undertaking.

Our Curiosity being fully satisfied, we left *Chamouny* the next Day, and lying at *Salanches*, we got the 23<sup>d</sup> to *Bonneville*. The Nearness of this Place to the *Maule* raised in us an Inclination to go up it. We set about this Task the next Day early in the Morning; we fancied that after the *Glacieres* every Mountain would be easy to us, however it took us more than five Hours hard labour in getting up; the Ascent being extremely steep; though, after two thirds of the Way, there is a fine green Turf quite up to the Top, which ends in a Point, the Mountain being like a Sugar-Loaf on one Side, and quite perpendicular on that Part which lies farthest from *Geneva*. From this Point there is a most delightful View, on one Side, upon the Lake, *Geneva*, and the adjacent Parts; on the other, upon high Mountains cover'd with Snow, which rise around, in form of an Amphitheatre, and make a most Picturesque Prospect. After having stay'd some time here, we returned back, and went on to *Annecy*, where we lay, from whence the next Day we got to *Geneva*.

Those who are desirous to undertake this Journey, ought not to set out till towards the Middle of *August*; they would at that time find not so much Snow on the Mountain. They might go to the Crystal Mines, and divert themselves with shooting of *Bouquetins*; the Oats would then be cut, and their Horses would not suffer so much. Although we met with nothing which had the Appearance of Danger, nevertheless I would recommend going well armed; 'tis an easy Precaution, and on certain Occasions very useful, one is never the worse for it, and oftentimes it helps a Man out of a Scrape. Barometers to measure the Height of the Mountains, portable Thermometers, and a Quadrant to take Heights with,

12 *An Account of the Glacieres in Savoy.*

with, would be useful, if there were a Mathematician in Company. A Tent would not be necessary, unless for those who had a Mind to examine every thing with the greatest Exactness, and make Observations; in this Case one might pitch it upon the Mountain, and pass the Night in it, if it were necessary, for it did not seem very cold there.

With these Precautions one might go through the other Parts of these Valleys, which form the Y, and one might find out whether the Cracks change daily as we were told; one might also Measure those excessive high Rocks which are on the Side of the *Glaciere*, and make many other curious Observations, according to the Taste and Genius of the Travellers; who, if they were inclined to Botany, might find an ample Field of Amusement.

One who understood Drawing might find wherewithal to employ himself, either on the Road, or in the Place itself; in short, a Man of Genius might do many things which we have not done. All the Merit we can pretend to is having opened the way to others who may have Curiosity of the same Kind.

It would be right to take Victuals ready dress'd, and Salt Meat, Bread and Wine, for there are some Places where one can get no Provisions, and the little there is to be had in other Places, is very bad. We bought a Sheep, which we killed, and dressed upon the Spot.

It is necessary to carry Halters to tie the Horses, cut Shoes, Nails, Hammer, &c. for they lose their Shoes continually in those stoney Roads.

With such Precautions all kinds of Journeys become easy and agreeable, even in the most desert Countries, and one is then more in a Condition to observe with Care and Accuracy, whatever occurs worth Notice.

This is the Substance, Sir, of what I can recollect of our Journey. My having so long defer'd giving you this Account is owing to the Incapacity I found in myself to say any thing worth being presented to a Person of so good a Taste as yourself. However, upon the whole, 'tis your good Taste which ought to encourage me: Your lively and penetrating Imagination, which unites in one, both the Poet and Painter, will at once lay hold and perfect what I have but slightly sketched. I am, with the greatest Esteem,

S I R,

*Your most Obedient Humble Servant.*



*An ACCOUNT of a Journey to the Glacieres in Savoy, in a LETTER addressed to the English Gentleman, Author of the foregoing Letter, by P. Martel, Engineer. Translated from the French.*

SIR,

SINCE your Departure for *England* I have had an Opportunity of going to the *Glacieres* of *Chamouny* along with four Friends, whose Curiosity had been raised by reading your Letter, which has been liked by all People of Taste, and resolved to endeavour to make those Observations which you was desirous to have made last Year. I therefore took with me every thing that appeared necessary for that Purpose, and made use of all possible Precautions to succeed, in the Manner you will see.

I do not present this Account to you, Sir, as a Work fit to be compared with yours, but rather as a Memorial, which will serve to supply your Journal with what you would have chosen to have put there, and which you certainly would have inserted yourself had you had Instruments with you.

You will first of all see what Instruments I provided, and what Precautions I took; you will see also a Journal of my Observations, to which I shall add an exact Account of what we saw. I shall endeavour to explain the Physical Cause which supplies the *Glacieres*. I shall put at the End of this Relation a View of the Valley of *Chamouny*<sup>a</sup>, taken from the Church; a View of the Valley of *Ice*, taken from *Montanver*<sup>b</sup>; a Map of the Road from *Geneva*<sup>c</sup> to the Source of the *Arve*, rectified from Observations made upon the Places; and some Designs of *Chamois* and *Bouquetins*<sup>d</sup>, which you may perhaps like to shew to your Friends in *England*. I shall join the Observations of one of my Friends, and Fellow Travellers, upon the Plants which we found both upon the Mountain, and in the neighbouring Places. Lastly, I shall compare our Observations and Mensurations, with those of the celebrated Mr. *Fatio de Duillier*, which are inserted in the Appendix to the History of *Geneva*. Be assured, Sir, that this Relation is very exact,

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<sup>a</sup> Plate 3.

<sup>b</sup> Plate 1.

<sup>c</sup> Plate 2.

<sup>d</sup> Plate 4.

14 *An Account of the Glacieres in Savoy.*

all the Operations have been repeated, and calculated twice with great Care, so that you may rely on the Exactness of every thing contained in this Account. Before I come to the Point, it may be proper to tell you who were the People that composed our Company. There was a Goldsmith very well skilled in Minerals; an Apothecary who was a good Chemist and Botanist; Monsieur *Martin* and Mr. *Girod*, whom you know to be very curious; which made us a Company pretty well qualified for this Undertaking, especially as each of them, according to his particular Turn, contributed to discover something, and besides that were very serviceable to me in making my Observations.

I took with me a good Barometer, included in a wooden Tube, which I filled at every Station, according to the Method of *Torricelli*, with all possible Precaution; and for this Purpose, carried a good deal of Mercury to be always provided in Case of Accidents: I had with me my Semicircle of ten *English* Inches Radius, with some Sea Compasses, a Camera-Obscura, and all Implements for Drawing. I took also a Thermometer of my own make, filled with Mercury, divided into a hundred equal Parts, from the freezing Point, to boiling Water, answering to 180 Parts of *Fahrenheit's* Thermometer, beginning at 32, and ending at 212. I divided my Barometer into Inches and Lines, *French* Measure, to have at once the Height of the Mercury. I left at *Geneva* with Baron *Rotberg* a Barometer and Thermometer, similar to those I took along with me; that I might compare our Experiments, with the Variations of the Barometer, in case the Weather had varied; but the Weather being all the Time fine, the changes were not sensible; your Journal served us as a Guide, both for our Route, and for several Precautions you mention as necessary.

I must observe to you that before our Departure, I waited on Professor *Calandrini*, to get some farther Instructions, concerning the Proportion of the Height of the Mercury, at different Distances from the Center of the Earth; he communicated to me a Canon to make a Table by, for that Purpose; but I preferred the fundamental Experiment, and the Tables of Mr. *Scheutzer*, for Reasons which may be seen in the Philosophical Transactions N<sup>o</sup> 405. You will find here all the Heights of the Mountains exactly calculated by those Tables, according to the Height the Barometer stood at, and I found them agree more exactly than any other with my Trigometrical Operations.

We left *Geneva* Aug. 20. 1742. Before we set out I tried my Barometer



Barometer, which upon the Side of the *Rhone* stood at 27 Inches  $\frac{2}{3}$  \*; and the Thermometer at 18 D. above the freezing Point which answers to 60. of *Farenheit*. We dined at *Bonneville*; where the Barometer was at 26  $\frac{8}{12}$ ; which make 6 Lines less than at the Side of the *Rhone* at *Geneva*; thus it appears that the *Arve* is at *Bonneville*, above the Level of the *Rhone* 403 F. 10 I. 5 L. *French Measure*; which is not a very great Rise, considering the Distance is 5 Leagues, or 15 Miles *English*.

We left *Bonneville* at half an Hour after two, and reached *Cluse* about six, and got to *Salanches* that Night. We made several Trials of the Echoes, which you mention in the Valley between these two Places, and found they continued full four Minutes. The great Drought had intirely stopped the fine Cascade you mention, at the *Nan Darpena*. At *Salanches* I tried my Barometer, which was at 26  $\frac{4}{12}$ , which was ten Lines less than at *Geneva*, and gave us in Height 670 F. 10 I. 0 L. above the *Rhone*. The Thermometer was not changed at all. Going from *Salanches* to *Servoz* we went through *Passi*, a Village situated almost at the Foot of a Mountain of the same Name. This Parish contains several Hamlets, which extend near three Leagues; *Passi* is on the right Side of the *Arve* going down the Stream, and on the other Side is situated the Village of *St. Gervais*, near four Miles beyond the last Hamlet of *Passi*. Leaving *St. Gervais* we began to climb the Mountain, and passed over a little Bridge, under which runs a Water called *la Gouille*, which falls from the Mountain, and carries with it a very black Sand; nevertheless near the Bridge there is a little Pond at the Bottom of a Hill, where this Water is vastly clear and beautiful. Not far from thence there is a Water which is called the *Nan des bois*: This too carries along with it a black Sand, which the Inhabitants say is blacker the more abundant the Water is: From thence we arrived at *Servoz*, on the right Side of the *Arve* in a very narrow Valley, from whence we began to discover the high Mountains which surround the *Glacieres*, the Barometer stood at I. 25  $\frac{7}{12}$ , which is I. 1  $\frac{7}{12}$  lower than at the *Rhone*, and gave for Height F. 1306. 0. 7. and from *Salanches*, the Difference of I.  $\frac{2}{12}$  which is F. 636. 0. 1. in five Leagues; this being the greatest Declivity that the *Arve* has from its first Source: For

\* All the Measures mentioned here are *French Measure*, the Foot being to our Foot as 114 to 107.

here it rolls from Mountain to Mountain 'till it comes to the Plain of *Passi*. At *Servoz* they shew'd us Lead-Ore, which to me seem'd to be of little Value; they assured us that this Valley of *Servoz* was formerly a Lake. There is still remaining an old Tower, at a small Distance from the *Arve*, which they call the *Tower of the Lake*. They add moreover, that on the Side of this Lake, there was a Town called the City of *St. Peter*, which was swallowed up, and that the Lake having broke thro' its Banks, run all out into the *Arve*, and there remains only now a marshy Valley.

From *Servoz* we took the Rout of *Chamouny*; we had the *Arve* on our right Hand, but soon passed it over a very bad Bridge, called *Pont Pelissier*; from whence we came to that steep Mountain, which they call *les Montées*, or the Stairs, where one of our Horses lost a Shoe and almost all his Hoof; from thence we entered into the Valley of *Chamouny*, having on our left the *Arve*, and on our Right a fine Hill, which reaches as far Southward as the Mountain called *Mont blanc*. Here we found several Signs of Iron Ore, at least they no ways differed from those by which they find out Iron Mines in *Burgundy*. A League farther we came to the Village of *Fouilly*, which is only a Hamlet of *Chamouny*, and from thence we arrived at *Moncoir*, where there is a Church belonging to *Chamouny*; and from thence passing the *Arve*, over a Bridge, we arrived at *Chamouny* in the Evening. Here I tried the Barometer, which at the Side of the *Arve* stood at  $25\text{ F. } \frac{4}{5}$ , which is  $1\text{ I. } \frac{1}{2}$  lower than at *Geneva*; from whence I concluded that the *Arve* at this Place was above the Level of the Lake  $1520\text{ F. } 5. 5$ . The Night between the  $22^{\text{d}}$  and  $23^{\text{d}}$  I hung out my Thermometer in the open Air, and found it in the Morning two Degrees above the freezing Point, which answers to  $35\frac{1}{2}$  Degrees of *Farenheit*. This made us cloath ourselves warmer, in order to go up the Mountain; for which Place we set out about six in the Morning, having with us seven Men both to assist us in climbing, and to carry Provisions; we took in other Respects the same Precautions as you did, and I carried my Instruments with me. At a Halt which we made after three Hours climbing, I tried my Barometer, which gave me  $1\text{ I. } \frac{4}{5}$  lower than at *Chamouny*; and by the Table, I found that we had mounted  $1179\text{ F. } 0. 1$ . from the *Arve* at *Chamouny*; after two Hours and half more very difficult climbing, we got on the Top of the Mountain called *Montanver*; from whence we saw the Ice Valley, and were struck with Astonishment at



at so extraordinary a Sight. After having taken a View of it while we rested, I tried the Barometer, which stood at  $22 \frac{5}{8}$  which was  $2 \frac{5}{8}$  less than at *Chamouny*, which gives for the Height of the Mountain 2427 F. 8. 10. and above the Level of the Lake F. 3947. 2. 3.

In order to find a Place to Dine in we descended towards the Ice, and got behind a kind of Mound, of great Stones which the Ice had raised, as I will explain hereafter. The Barometer rose two Lines, which shewed us we had gone down F. 159. 7. 8. in this Place we dressed our Victuals, and dined under the Shade of a great Rock. The Thermometer was got down to only one Degree above the freezing Point, which answers to about  $33 \frac{1}{2}$  of *Fahrenheit*. We were not able to stay here long by reason of the Cold, which obliged us to get into the Sunshine, altho' we were dressed as in the Middle of Winter; and after Dinner every one went according to his Inclinations, some upon the Ice, others to look for Crystal; for my Part I took two Men with me, and returned to *Montanvert*, where I remained near three Hours, which time I employed in making a Plan of the *Glacieres*, which I have put at the End of this Account. I was assisted in this Operation by my Guide, who was a very intelligent Person, not only knowing the Country, but having also assisted in the last Survey, which the King of *Sardinia* had caused to be made of *Savoy*. I have more reason to believe this Map to be exact, because I have compared it with a Map that I saw at the *Greffier's* of *Chamouny*, which was of great Service to me. The Nearness and Height of the Mountains rendered it impossible to make use of my *Camera Obscura*, to take a Prospect of the *Glacieres*, so that leaving *Montanvert*, I arrived at the Priory of *Chamouny* at Seven in the Evening.

My Companions were next Morning in so great a hurry to go away, that I had not time to draw any Views as I intended; all I could do was to take with my Semicircle the Height of the *Mont Blanc*, by two different Operations which corresponded exactly. I did the same for the *Montanvert*, where we had been the Day before, and just sketched out the View of *Chamouny*, here annexed, taken from above the Church, from whence I could see the Mountain where the *Arve* takes its Source, the chief Outlets of the *Glaciere*; the highest Mountains; and the Villages, as you will see in *Plate 3*.

I shall here interrupt my Narration, to give you a more distinct Idea of the Valley of *Chamouny*, the *Glacieres*, and whatever seemed to me to be most remarkable, during the short time which I remained there. First of all then, The Valley of *Chamouny* may be considered as reaching from the Top of the Mountain called the *Montées*, as far as the Mountain, from whence the *Arve* takes its Source, which is called the *Col de Balme*, which bounds it to the N. E. The Maps give this Valley the Form of a Crescent, but if it were so it ought to be narrow at the Ends, and wide in the Middle; but it is on the contrary rather narrowest in the Middle; however it must be owned that it bends considerably. At the Entrance into it from *Servoz* it runs from West to East, and afterwards to N. E. so that it forms an Elbow about the Middle.

The Length of this Valley is about eighteen *English Miles*; as for its width, at least in the Middle, it cannot be above 400 Geometrical Paces, or about half an *English Mile*. It contains several Hamlets, the four principal ones are, *Fouilly*, just as you come into it; *Montcoir*, where there is a Church on the Left of the *Arve*; the Priory, which is in the Middle, properly called *Chamouny*, and is on the right Side of the River; and *Argentiere* near the End of the Valley. This Valley is bounded on the N. E. by the *Col de Balme*, where the *Arve* rises from two Springs, at a very little Distance from one another; having the *Glacieres* to the S. E. all along the Valley, which reach as far as above St. *Gervais*, in the Valley of *Salenches*, where there is a *Glaciere*, called *Glaciere de St. Gervais*, which comes from *Mont Blanc*, bending a little towards the South, and not following the Curve of the Valley.

The N. W. Side is bounded by the Mountains of *Valorfine*, and the S. W. by the Passage which goes to *Servoz*. The *Arve* runs quite through the Middle of the Valley, receiving in its Passage the *Arbairon*, and many other Rivulets and Torrents, which only have Water when the Snows melt. To have a distinct Idea of the *Glacieres* you must suppose a great Valley, nearly parallel to that of *Chamouny*, but much higher, it being situated on the Top of high Mountains. This Valley may be about twelve Miles long, and about two broad; a great Part of it may be seen from *Montanvert*, which is the Mountain we went up. From thence you see many Points of Mountains, shooting



shooting up to a prodigious Height, altho' the Place on which we were is near *F. 2427. 8. Paris Measure* high above the Valley, the Barometer being lower by  $2\frac{1}{3}$  Lines at the Top of it than at the Bottom, and having calculated the Height of this Mountain, by a trigonometrical Operation, upon a Base of 1440 Feet, I found nine Feet more, and this by two different Operations. Having from the same Base measured the Height of the highest Point of the *Mont Blanc*, I found by two Operations 10939, taking in the Height of the Mountain where we were, and from the *Rhone* 12459 Feet. Most of these Points are all covered with Ice, from the Top quite to their Bottoms, which join the *Glacieres* of each Side.

I can think of nothing more proper to give an Idea of this Valley, than the Comparison you have made use of, namely, a great Lake, which being violently agitated by a strong Wind, should have been frozen all at once. For all the *Glaciere* when seen from *Montanvert* has at first that Appearance; but as soon as you come near it, you perceive that some of the Inequality or Waves are more than forty Feet high.

This great Valley has many Outlets between the Mountains; five of which, being the principal ones, come into the Valley of *Chamouny*, and these Extremities, or Outlets, are what the Inhabitants of *Chamouny* call *Glaciers*. These Outlets are very steep, some more so than others. Now to judge of the Cause, which occasions a perpetual Ice in this Valley, we must consider its Situation in two Respects; *First*, As to the Sun; and *Secondly*, As to the Atmosphere. We must consider its greatest Length, as lying from the Sunrising in the Summer Solstice, to the Sunsetting in the Equinox, by reason of its Curvity, being of all Sides surrounded with very high Mountains, and that chiefly on the South Side, where there is the Mountain *des Echaux*, which is very high. The North Side of this Mountain is always covered with Ice, while the Mountain, which is opposite to it on the other Side of the *Glaciere*, has no Ice at all on it. As to the Atmosphere, you must remember that the Surface of the Ice is raised above the Valley of *Chamouny* 2262 Feet. This great Height causes the Air to be always very cold in this Valley of Ice, of which I will add some incontestable Proofs. We were there in the Month of *August*, in very fine dry Weather, without any Appearance of Rain, nor was there  
any

any Wind stirring all that Day we were upon the Mountain, but always a clear Sun shine; nevertheless my Thermometer descended to two Degrees above the freezing Point, which answers nearly to  $35\frac{2}{3}$  of *Farenheit*; and this in the Valley of *Chamouny*, where the Air is not near so piercing as it must necessarily be on the Ice Valley, where the Thermometer sunk one whole Degree, under the Rock where we dined, besides when we set out from *Chamouny* in the Morning, we passed dryshod over the Beds of many little Streams, which descend in the Day-time from the Mountains, and which ran abundantly at our Return in the Evening; so that we were forced to go over the Foot Bridges. *Thirdly*, We saw upon the Valley of Ice a vast Number of little Reservoirs, containing a very fine Water, which immediately congeals after Sunset; and that in the greatest Heats, as all the Inhabitants of the Country assured me unanimously, not having remained late enough on the Mountain to have seen it myself. But this Observation is confirmed by the little Rivulets above mentioned, which cease running in the Night. If one considers the Height of these Mountains, which I have already mentioned, whose Tops lose themselves in the Clouds; if one considers the vast Quantities of Water, which must come from them by the melting of the Snow, that covers them upon the least Rains that happen in the Plain, and that this Water and Snow turn into Ice immediately at Sunset; it is easy to discover the Cause which fills these Valleys with Ice. These Reasons, in my Opinion, are sufficient, without having recourse to the Effects of Nitre; nor indeed have we found any Appearance of it in the Taste of the Ice: And I may add, that, having put some of this Water into a Silver Spoon, and made it evaporate by Fire, it left neither Sediment, or any Films, nor any other Marks of Nitre: So that I am firmly persuaded, that Nitre has no Share in the Production, or the Conservation of this Ice. For Ice, produced by an artificial Congelation, has an acrimonious Taste; whereas this produces a sweet Water, equal to that of our best Springs. The *Glacieres* in the Ice Valley are not always in the same State, they sometimes augment, and sometimes diminish; it is probable they have been more abundant; by the Marks which remain they must have been 80 Feet higher than they are now. One sees on both Sides of the *Glacieres*, and in the Outlets, a white Stone, mixed with a white Sand, very like the Rubbish of  
old



old Buildings. The Stone appears calcin'd, and breaks like Lime that has been expos'd some time to the Air; the Edges of the *Glacieres* are very steep, probably because the Ice rises against the Bank. The Place where we dined was a kind of large Parapet of Stone-work, the Stones of which were very large, and heaped one a Top of the other like a Wall, being very steep towards the Ice, with very little or no slope. This kind of Wall was about 80 Feet high, and 20 thick; behind it was a kind of a Terras which joined the Mountain, from whence we could not see the Ice without getting on the Parapet. It is to be observed, that the *Glaciere* is not level, and all the Ice has a Motion from the higher Parts towards the lower; that is to say, that it slides continually towards the Outlets into the Valley, which has been remarked by many Circumstances. *First*, By great Stones, which have been carried quite into the Valley of *Chamouny*; they shewed us one of a very large Size, which several old People assured us, that they had seen upon the Ice. I have already said, that the Waves, for so I call the Inequalities of the Ice, were some of them 40 Feet high. I will now add, that the Hollows between them run all transversely to the Course of the Ice; so that in the Valley they lay one way, and in the Outlets another, always crossing the Direction of the Ice: The Cavities between the small Waves are all full of a very clear Water; there are on the Ice an infinite Number of Clefts, of different Widths, some twenty Feet long, and four or five wide, others less. These are almost all in the weak Parts of the Ice, *i. e.* in the Hollows of the Waves, and all directed like the Waves in a transverse, or oblique Manner. 'Tis by these Clefts we could judge of the Thickness of the Ice; in the Hollows it is only 5 or 6 Feet thick, in the high Waves 40 or 50. The Reflection of the Light in these Clefts produces the Effect of a Prism; and 'tis very beautiful, even from the Mountain, to see the Mixtures of blue and green arising from these Clefts, and the Reservoirs of Water, especially when the Sun shines on this vast Valley of Ice. By these same Clefts you see under the Ice, Waters which run from it, at least in the Day-time, which sometimes must touch the inferior Surface of the Ice, as they did then, of which I shall give two Proofs, which appear incontestable. *First*, Our Guides push'd a Pole a great way in, and having let it go, it rose again of itself, which could be occasioned by nothing but the Water.

The

The other Proof is, that when any have had the Misfortune to fall into these Clefts, which has happened to some Searchers of Cryſtal, they have been found again upon the Ice, perfectly preſerved after a few Days, as ſoon as there has been a little Rain, or mild Weather. The Cauſe of this can only be the Increate of the Water, which, not finding a ſufficient Paſſage under the Ice, riſes by theſe Clefts, and ſo gets rid of every thing that is lighter than itſelf: But becauſe the Paſſage for ſo large a Quantity of Water is not ſufficient, though the Number of Clefts be very great, it is very probable, that it often raiſes the whole Maſs of Ice. One might draw from this many Conjeclures, both for diſcovering the Cauſe of the Increate of the *Glacieres*, during the Time of the greateſt Heats, and alſo to explain the Elevation of the Stones on the Edges.

I have already ſaid, that the Thickneſs of the Ice is very conſiderable, and I will now ſay ſomething upon its Conſiſtence. We found it generally much lighter, and much thinner towards the Edges of the Valley, than in the Middle: For although both the one and the other ſwim upon the Water, yet that in the Middle ſinks the deepeſt. I obſerved before that the Mountains or Points, which we ſaw from the Mountain which we went up, are very high, and that there are many of them. I particularly mentioned three of the principal of them, namely, one towards the South, and two towards the Weſt; that which is towards the South, and which we firſt diſcovered before us, is called *L'Eguille du Dru*; this Point looks very like an Obeliſk, the Top of which is loſt in the Clouds, making a very acute Angle at the Summit, and not much unlike a great *Gothic* Tower, built of white and brown Stone, the Parts of which are very rough. For we muſt obſerve, that the Pieces which fall off break in a perpendicular Direction, leaving here and there little Parts by themſelves, which make the Mountain look as if it was compoſed of an infinite Number of little Towers. The Effect of this is very beautiful when the Sun ſhines on them, by reaſon of the agreeable Mixture of *Clair Obscur*, which is prodigiouſly varied: This Mountain is too ſteep to have any Ice upon it, or indeed much Snow. The two other Points on the Weſt Side are *L'Eguille de Montmallet*, which is covered always with Ice, and is the neareſt the *L'Eguille du Dru*; and *Mont Blanc*, which is the fartheſt to the Weſt. 'Tis this Point of *Mont Blanc*, which is ſuppoſed to be the Heigheſt in all the *Glacieres*, and perhaps of all the *Alps*. Many Perſons of the  
Country



Country who have travelled assured me, that they had seen it from *Dijon*, and others from *Langres*, which is 135 Miles distance. For the Top of it is easy to be distinguished, because it is blunt, and quite steep on the North-side; if the Sides were prolonged, so as to make an Angle at the Top, I imagine it would be of 25 or 30 Degrees. This Mountain is entirely covered with Ice, quite from the Top down to the Bottom. The Mountain which we went up in order to see the Valley of Ice has three Names, the East-side is called *Montanvert*, and that towards the West *Blaitiere*, and that in the Middle the *Charmaux*. Upon this Mountain there rise four Points something like the *L'Eguille du Dru*, which are called the Points of *Charmaux*. All these Points are absolutely inaccessible, some by reason of the Ice, which covers their Surface almost entirely, as *Montmallet* and *Mont Blanc*, and others on account of their Steepness. 'Tis at the Foot of these Mountains, and along the Valley of the *Glacieres*, that they find Crystal, and not under the Ice, as some have pretended. The Crystal is found in the very Substance of the Rock, after this Manner: Those who go in search of it know where to find it by certain white and blue Veins, which they see upon the Rock. These Veins are either alone, or many of them together, which unite in one Point; they strike upon the Extremity of the Veins, and when they hear a hollow Sound they break the Rock, and find the Crystal in Cavities, which are sometimes many Feet deep, which they call Ovens. Crystal is a Stone which, in my Opinion, is produced by a gentle Vegetation, and not by Congelation; every one knows that they are Shoots, all of the Figure of a Hexagon, joined one to another, almost like the Cells in Honey Combs. These Shoots are sometimes unequal in Thickness and Length, but all terminate in a Point, as if they had been cut Diamond Fashion, they all stick to a kind of Stone of an irregular Shape, which is a kind of Root to them, partaking of the Nature both of Rock and Crystal, of a blue, white, black, and brown Colour, extremely hard and heavy; this Stone is called the *Matrix*. We must observe, that when once the Crystal is taken away, there never comes any other, although the *Matrix* be left in the same Place where it was found: And this has made some People think that Crystal was formed from the Beginning of the World. It happens sometimes that Pieces of Rocks fall down with the Ovens of Crystal contained in them, and roll upon the Ice. 'Tis for this Reason that the Countrymen often find Pieces of Crystal on the Surface of the Ice,

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and

and sometimes adhering to it, and even in the Current of the Water, which forces itself up thro' the Clefs of the Ice. There are some Places where the Cattle cross over the Ice to go and feed at the Bottom of the Mountains, on the other Side of the Valley, in Places where the Sun can come, and where there is some Pasture, and they do it the more easily, because the Surface of the Ice is sprinkled over with Gravel, or small Particles of Rock, which the Wind probably brings from the neighbouring Mountains. We found also upon the Ice many large Stones, which in my Opinion had fallen down from the Tops of the Mountains, altho' the People of the Place pretend that they were raised from the Bottom of the *Glacieres*. I have already observed, that the Valley of Ice has a Communication with the Valley of *Chamouny*, by five Openings, each of which has a Name, as will be seen in the Plan at the End of this Account. The *Glacieres* stretch by diverse Openings and Vallies, as far as the Valley of *Courmayeu*, in the *Val d'Aoste*, but not by an uninterrupted Communication as formerly, by reason of the falling down of some Pieces of the Mountain: And therefore it is impossible to go from *Chamouny* to *Courmayeu*, by the Valleys of the *Glacieres*. Of the five Openings which end in the Valley of *Chamouny*, that which is called the *Glacier des Bois* is the most considerable, not only for its Beauty and Largeness, but because the River *Arbairon* has its Source there; it comes out from under the Ice, through two Arches all of Ice. 'Tis a Sight equally beautiful and extraordinary to see the Inequalities which rise above these Passages more than 80 Feet in Height, and which appear to be the finest Crystal in the World, reflecting an infinite Number of bright Colours, just as if one looked through so many Crystals, as there are Excrescencies of Ice. For you must imagine this Place, as composed of a vast Quantity of vertical Shoots, adhering to each other, and terminating unequally both above and below. 'Tis not without great Difficulty that we came to this Place, so worthy of Admiration; we were even forced to go thro' one of the Passages where the Water was not so abundant as at the other, and not without Danger, by reason of the Pieces of Ice which fall off sometimes, which our Guides have seen happen.— The *Arbairon* is a large Stream which falls into the *Arve*; it comes from under these Arches, and carries along with it a vast many Particles of Gold, as the Goldsmith who was with us shewed us. The Rivulet of *Argentiere*, which comes from the *Glacier* of the  
same



same Name, carries with it also Pieces of Gold and Silver, which has not been observed at the Source of the *Arve*. I imagine that the *Arbairon* has another source besides the melting of the Ice, because the Water never fails no more than that of the *Arve*, which rises in a Mountain, where there is neither Ice nor Snow in Summer. However that may be, the *Arve* and the *Arbairon* carry along with them a very fine and white Sand, which makes the Water look as if Soap had been dissolved in it; it keeps this Colour, till it receives the *Nan de Bois* into it, of which I have already spoke. Which brings a very black Sand, that changes its Colour to a dark grey, which it keeps till it falls into the *Rhone* below *Geneva*. I imagine it may take along with this last mentioned Water some Gold Dust, for we observed in crossing this *Nan de Bois* a vast many Stones, which seemed to contain both Gold and Silver. All the *Glacieres*, at least those which are called the *Glacieres of Chamouny*, are situated on the left Side of the *Arve*; there is indeed a little one on the other Side, in the Mountain of *Valorfine*, but it is not considerable, and has no Communication with the rest. Before I quit *Chamouny*, I'll say a Word concerning its natural History. The Inhabitants of this Country are very good sort of People, living together in great Harmony, they are robust, live to a great Age, and have very few Beggars among them; they don't begin to cultivate their Lands till the Spring, after the Snows are melted, which is sometimes at the End of *April*, and sometimes at the End of *May*; then they begin to Plough, and Sow their Grains, such as Rye, Barley, Oats, Beans, and Buckwheat, which they reap in *September*. And of all these Grains they make a kind of Cake, which is very hard, because they dry it in the Sun after it is baked, and they preserve it thus many Months. They don't make use of Wheat but for Children, and that in very little Quantity. 'Tis surprising to see how the Mountains are cultivated, in Places that are almost perpendicular, where they Plough and Sow as cleverly as can be done on the Plains. This we first observed near *Salanches*. Fruits ripen very late in this Country, for we saw Cherries there which were not quite ripe, and we found Flowers and Fruits on the Mountain, which are never seen with us, but in the Spring. We observed, as we were going up the Mountain, a fine clear Mineral Water, partaking of Iron and Sulphur, it is very delicious and cool; their Honey is white, resembling very much that of *Narbonne* for Colour, but not for Taste. The Sheep which are kept

kept near the *Glacier* lick the Ice, which serves them for drink; they are left without any one to watch them, there being in this Valley no Beast of Prey, though Bears, Wolves, and Foxes abound in the Country all about. Nothing inhabits here but *Chamois*, *Bouquetins*, who keep in the high Mountains, and a great Quantity of *Marmotes*; this is the Account the Inhabitants gave us of this Animal. They sleep six Months of the Year, that is, all Winter, and in the Summer they provide a warm Couch against their Time of Sleeping; for this End they cut Herbs with their Teeth, and in order to carry them to their Holes one of them lays on its Back, and the others load it like a Cart, and then drag it by the Ears to the Hole. They pretend also that they provide against being surprized, by placing Centinels, who give them the Alarm by a whistling Noise; they eat these *Marmotes*, and find them very good, and use their Fat to burn in Lamps; there are no Birds of Prey in this Valley, nor Crows, neither are there ever any Swallows. I observed a remarkable kind of Grasshopper, much resembling a Dragon Fly, with long Legs. We staid at *Chamouny* from *Tuesday* Evening to *Thursday* Morning; but I could make no more Experiment with my Barometer, because it had been damaged. We went from thence, and lay at *Cluse*, and from that Place to the Mountain called the *Maulè*, which I look upon to be somewhat higher than *Montanver*, because we were half an Hour longer in going up it, although the Road is very even, as well as steeper. I wished to have had my Barometer to take the Height of it, but I was forced to content myself when I got up to the Top to observe the Angle of Position of the *Glacieres*, with respect to *Geneva*, which I found to be 158 Degrees precisely. I looked down on all the Objects about us with great Pleasure; the Prospect put me in mind of that fine Plan which you have seen in our Publick Library, for the Plain below, seen from this high Mountain, at first Sight gives one the same Idea. 'Tis wonderful to see those Places, which we take to be nothing but high Mountains, divided by fine and fertile Valleys, covered with all sorts of Trees and Fruit, an infinite Number of Villages, which being in deep Bottoms, appear from thence to be situated in a rural and agreeable Manner. In a word, all the Pains I took to clamber up this Mountain were sufficiently recompenced by a Prospect so beautiful and so uncommon. After having staid in this Situation about half an Hour, we went down again, and continued our Journey. We lay at *Contamines*, from  
whence



whence we arrived at Geneva, Saturday Morning the 26<sup>th</sup>, all vastly well satisfied with our Journey, and without any other regret than not having stayed longer at Chamouny, to have considered the Beauties of the Places thereabouts. Those who may hereafter be desirous to undertake this troublesome and curious Journey, ought to add to the Precautions which we have pointed out, that of employing more time in it, and, if possible, to come round by Switzerland, which would be very easy from Chamouny. Nothing could be more agreeable than this Journey, by reason of the Rarity and Variety of Views which continually occur; but then it would be right to view the *Maule* in going there. Suffer me, Sir, to address this Account of our Voyage to you, as the Person to whom of right it belongs; you marked us out a way which was easy to follow by the Help of your Directions. I hope you'll pardon the Incorrectness of my Style, and want of Method in putting things together; I committed to Paper whatever occurred to me and my Companions; 'tis Truth alone which can recommend these Papers, and 'tis that alone which can engage you to receive them favourably, and as a Mark of the sincere Regard with which

I am,

S I R,

Your most Humble

and most Obedient Servant,

P. M.

P. S. In going up *Montainver*, through a very narrow and difficult Path, towards the *Glaciere de Bois*, we found some fine Plants, without either quitting our Guides, or our Company, or going out of the Path; namely, *Pyrola folio mucronato*; *Consolida Saracenica minor Alpina*; *Alchymilla Alpina minor quinque-folia*; *Lamium album Plinii*; *Asclepias flore albo*; *Victorialis longa*; *Euphrasia Alpina luteis floribus*; *Meum Athamanticum*; *Carlina acaulis*; *Helleborus albus*; *Lapathum* of many Kinds. Not to mention many other Plants, which would rather make a Catalogue than a Relation of a Journey. All along this Mountain there are many kinds of Pine and Fir; there are also many Larch Trees in *Latin Larix conifera folio deciduo*; we found there some fine Agaric, and in the Trunks of several Larches there were Horizontal and Lateral Incisions, by which the *Italians* had extract-  
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28 *An ACCOUNT of the Glacieres in Savoy.*

ed Turpentine. At the Source of the *Arbairon*, which is at the Foot of the *Glaciere de Bois*, in the Valley of *Chamouny*, and even in the Bed of this Source of the *Arve*, which was not covered with Water, we found the following Plants; namely, *Muscus capillarius lanuginosus densissimus*; *Lythophyton album nodosum*; *Sedum alpinum subhirsutum, coronâ floris purpurascente, disco viridi*, and many other kinds of *Sedum*.

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*Comparison of our Observations with those of Mr. Fatio de Duillier, which are inserted in the Appendix to the History of Geneva, 4th Edit. Tom. II. pag. 450.*

“THE Height of the Mountain called the *Maudite* is above the Level of the Lake at least 2000 *French Toises*, or about 4374 *English Yards*.”

I said above, that we found the Height of the *Arve* at *Chamouny* 1520 *F.* above the Level of the *Rhone* at *Geneva*, and the Height of the highest Mountain 10939 *F.* above the *Arve* at *Chamouny*, which in all make above the *Rhone F.* 12,459. 5. 5. which being reduced to *Toises*, give 2076. 3. 5.  $\frac{1}{4}$ . Now Mr. *Fatio* has found it above 2000 *Toises* above the Level of the Lake, 7 Leagues above *Geneva*, where it must at least be 50 Feet higher than *Geneva*; so I take it that we have corresponded pretty exactly in our Operations. It is to be remarked also, that Mr. *Fatio*'s Observation was made at 45 Miles from the Mountain, and mine just at the Foot, and consequently much less subject to Refraction.



F I N I S.

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W. H. J. J. J.

View of y. Ice Valley, & Mountains that surround it, from Mount Anver.

W. H. J. J. J.



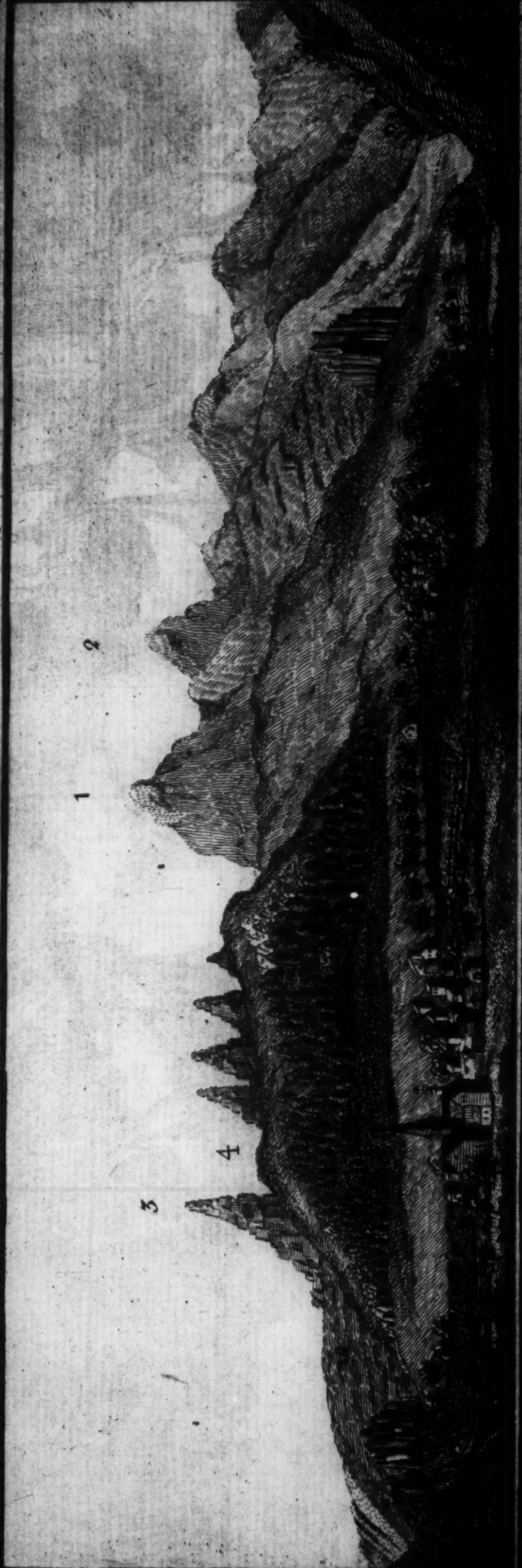


1 Le Mont Blanc	5 Le Mont Lognon	9 Le Mont de Valorsine	13 Le Glacier des Bégons	17 La hauteur de la Roche de Bionville, sur le Mont de Blanc
2 Le Mont Malay	6 Le Mont Paucier	10 Le Mont Pelissier & la Montagne	14 Le Glacier d'Argentière	18 La hauteur de Chamouny
3 L'Eglise du Dru	7 Le Mont du Tour	11 La Vallée de Chamouny	15 Le Glacier du Tour	19 La hauteur de Mont Blanc
4 Le Montanvert	8 Le Mont des Cèlous	12 Le Glacier des Bois	16 Le Glacier de Trian	20 La hauteur de la Roche de Bionville, sur le Mont de Blanc

Pl. 3

## VEÛF DE LA VALLEE DE CHAMOUNY ET DES GLACIERES.

du Costé Meridional depuis L'Eglise de Chamouny, pris sur les lieux, l'an 1742.



Pl. 4

## DIVERS ANIMAUX QUI HABITENT CES MONTAGNES.

a Bouquetin b Chamois c Marmotte



Pl. 5. Delin.